

Assignment 2

1. Finite element equation of truss system

Idealize the simple truss system shown in Figure 1 as an assemblage of two truss elements. The two truss elements have the same length L , the same elastic modulus E , and the same cross section area A . The time-variant load tR is applied at node 1. It is assumed that the structure is subjected to large displacement and large strain, but the material still keeps in its elastic region. It is also assumed that the elements have only stress normal to the cross section, and the stress is constant along the element.

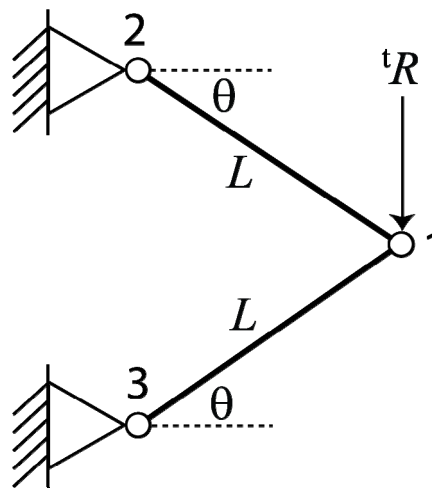


Figure 1. Considered truss system

- (1.1) Derive the tangent stiffness matrix for the system and the nodal point force in the configuration at time t .
- (1.2) Derive the governing finite element equation of the system in any configuration.

Hint: Example 6.16 and 6.17 in Bathe (1996) may be useful.